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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/750,522	12/31/2003	Donald S. Gardner	42P16465	1973

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BLAKELY SOKOLOFF TAYLOR & ZAFMAN
12400 WILSHIRE BOULEVARD
SEVENTH FLOOR
LOS ANGELES, CA 90025-1030

EXAMINER	
LEE, HSIEN MING	

ART UNIT	PAPER NUMBER
2823	

DATE MAILED: 11/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/750,522	GARDNER, DONALD S.	
	Examiner	Art Unit	
	Hsien-ming Lee	2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 October 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-36* is/are pending in the application.

4a) Of the above claim(s) *16-30* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,12-15,31,35 and 36* is/are rejected.

7)☒ Claim(s) *2-11 and 32-34* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12/31/2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

HSIEN-MING LEE
PRIMARY EXAMINER

11/06/06

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Remarks

1. Applicant's election to claims 1-15 and 31-36 is acknowledged. Applicant is reminded to cancel non-elected claims.

Claim Objections

2. Claims 32-36 are objected to because of the following informalities: in the preamble, "The system" should have been written as -- The circuit --. Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1, 12 and 13 are rejected under 35 U.S.C. 102(e) as being anticipated by Dehmubed et al. (US 6,954,473).

In re claim 1, Dehmubed et al., in Fig. 1A and corresponding text, teach an optical modulator device (col. 7, lines 48-49) comprising:

- a substrate 10/12/14 formed from a semiconductor material;
- an optically active layer 44 formed on an upper surface of the substrate 10/12/14, the optically active layer 44 (i.e. the heterojunction structure) including a layer of SiGe

(col. 14, lines 22-25) having a quantum well 20 and 24 to provide electro-absorption of light (col. 10, lines 7-13) in the optically active layer 44;

- a layer of semiconductor material 28 (i.e. P-type layers) formed on an upper surface of the optically active layer 44; and
- an electrical contact 30 formed on an upper surface of the layer of semiconductor material 28 to provide an electric field to alter the electro-absorption of light in the optically active layer 44.

In re claim 12, Dehmubed et al. teach that the optical modulator is an optical waveguide modulator (col. 7, lines 49-51).

In re claim 13, Dehmubed et al. teach that that the optical modulator comprises an optical cavity 34 in optical communication with the optically active layer 44 (col. 9, lines 59-64).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dehmubed et al. in view of Chu et al. (US 6,949,761).

In re claim 14, Dehmubed et al. do not teach that the thickness of the layer of SiGe is between five and thirty nanometers.

Chu, et al., however, in an analogous art of forming a heterojunction structure comprising strained SiGe, teach that the thickness of SiGe is a consideration of minimizing the formation of misfit dislocation (col. 6, lines 44-46).

Therefore, it would have been obvious to one of the ordinary skill in the art, at the time the invention was made, to choose the thickness of layer of SiGe in Dehmubed et al. to be less than a critical thickness of avoiding the formation of misfit dislocation, as taught by Chu et al, since by this manner it would ensure proper optical properties of the layer of SiGe.

7. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dehmubed et al. in view of Goossen (US 6,424,450).

Dehmubed et al. do not teach that the substrate is germanium.

Goossen, however, teaches that using germanium as the substrate in the optical modulator would achieve better reflectivity (col. 5, lines 41-44).

Therefore, it would have been obvious to one of the ordinary skill in the art, at the time the invention was made, to use germanium as the substrate, as taught by Goossen, in the optical modulator of Dehmubed et al., since by doing so it would improve the reflectivity of the substrate, which in turn would improve the performance of the optical modulator.

8. Claims 31 and 35 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dehmubed et al. in view of Brunner et al. (US 6,403,975).

In re claim 31, Dehmubed et al., in Fig. 1A and corresponding text, teach an integrated circuit comprising:

- a substrate 10/12/14 formed from a semiconductor material; and

- an optically active modulator with an optically active layer 44 formed on the semiconductor substrate 10/12/14 including a strained layer of SiGe (col. 14, lines 22-25) having a quantum well 20/24 to provide electro-absorption of light.

Dehmubed et al do not expressly teach that an optical fiber has a first end in optical communication with the optical modulator 44. Dehmubed et al , however, do suggest using optical fibers in integrating with the optical device for transporting optical signals (col. 1, lines 53-56).

Therefore, it would have been obvious to one of the ordinary skill in the art, at the time the invention was made to include optical fiber in the optical modulator, since optical fibers can be used as signal medium for receiving and sending optical signals.

In re claim 35, Dehmubed et al do not expressly teach that the substrate is formed form silicon. However, Brunner et al. teach using silicon as the substrate in the optical-electronic application (col. 6. line 52).

Therefore, it would have been obvious to one of the ordinary skill in the art, at the time the invention was made to use silicon as the substrate, as taught by Brunner et al., in the optical modulator of Dehmubed et al, since silicon is a cost effective material for the application.

In re claim 36, the selection of the germanium percentage in the strained layer of SiGe is obvious because it is a matter of determining optimum process condition by routine experimentation with a limited number of species. In re Jones, 162 USPQ 224 (CCPA 1955)(the selection of optimum ranges within prior art general conditions is obvious) and In re Boesch, 205 USPQ 215 (CCPA 1980)(discovery of optimum value of result effective variable in a known process is obvious). In such a situation, the applicant must show that the particular range is

critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range. See M.P.E.P. 2144.05, III

Allowable Subject Matter

9. Claims 2-11 and 32-34 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

10. The following is a statement of reasons for the indication of allowable subject matter:

In re claim 2, the prior art of record neither teaches nor suggests that the layer of SiGe comprises a layer of *nanocrystals*.

In re claim 3, the prior art of record neither teaches nor suggests that the layer of SiGe is a strained layer of SiGe *having a dopant to provide electrons* in the strained layer of SiGe.

In re claim 32, the prior art of record neither teaches nor suggests that the strained layer of SiGe is *doped* with at least one of arsenic, phosphorus and antimony.

11. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hsien-ming Lee whose telephone number is 571-272-1863. The examiner can normally be reached on Monday, Tuesday and Thursday (7:30 ~ 6:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on 571-272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Hsien-ming Lee
Primary Examiner
Art Unit 2823

Nov. 6, 2006

HSIEN-MING LEE
PRIMARY EXAMINER

11/6/06